IV Year-II Semester		L	T	P	C
		4	0	0	3

ELECTRICAL DISTRIBUTION SYSTEMS (R1642023)

Prerequisite Course:

Power systems - I
Electrical Circuit Analysis - I

Course Description and Objectives:

This subject deals with the general concept of distribution system, substations and feeders as well as discusses distribution system analysis, protection and coordination, voltage control and power factor improvement.

Course Outcomes:

Upon completion of the course, the student will be able to achieve the following outcomes.

Cos	Course Outcomes	POs
1	To understand various factors of distribution system.	5
2	To design the substation and feeders.	6
3	To determine the voltage drop and power loss.	6
4	To understand the protection and its coordination.	4
5	To understand the effect of compensation forp.f improvement.	4
6	To understand the effect of voltage control.	3

Syllabus:

UNIT I:

Objective: Learn general concepts of distribution systems

General Concepts

Introduction to distribution systems, Load modeling and characteristics – Coincidence factor – Contribution factor loss factor – Relationship between the load factor and loss factor – Classification of loads (Residential, commercial, Agricultural and Industrial).

UNIT II:

Objective: Design the substation and feeders.

Substations

Location of substations**:** Rating of distribution substation – Service area with'n'primary feeders – Benefits and methods of optimal location of substations.

Distribution Feeders

Design Considerations of distribution feeders**:** Radial and loop types of primary feeders – Voltage levels – Feeder loading – Basic design practice of the secondary distribution system.

UNIT III:

Objective: Determine the voltage drop and power loss.

System Analysis

Voltage drop and power–loss calculations**:** Derivation for voltage drop and power loss in lines – Uniformly distributed loads and non-uniformly distributed loads – Numerical problems - Three phase balanced primary lines.

UNIT IV:

Objective: Understand the protection and its coordination.

Protection

Objectives of distribution system protection – Types of common faults and procedure for faul calculations for distribution system – Protective devices**:** Principle of operation of fuses – Circuit reclosures – Line sectionalizes and circuit breakers.

Coordination

Coordination of protective devices**:** General coordination procedure –Various types of co-ordinated operation of protective devices - Residual Current Circuit Breaker

UNIT V:

Objective: Understand the effect of compensation for p.f improvement.

Compensation for Power Factor Improvement

Capacitive compensation for powerfactor control – Different types of power capacitors – shunt and series capacitors – Effect of shunt capacitors (Fixed and switched) – Power factor correction – Capacitor allocation – Economic justification – Procedure to determine the best capacitor location – Numerical problems.

UNIT VI:

Objective: Understand the effect of voltage control.

Voltage Control

Voltage Control**:** Equipment for voltage control – Effect of series capacitors – Effect of AVB/AVR – Line drop compensation – Numerical problems.

TEXT BOOKS:

1. “Electric Power Distribution system, Engineering” – by TuranGonen, McGraw–hill Book Company.

REFERENCE BOOKS:

1. Electrical Distribution Systems by Dale R.Patrick and Stephen W.Fardo, CRC press
2. Electric Power Distribution – by A.S. Pabla, Tata McGraw–hill Publishing company, 4th edition, 1997.
3. Electrical Power Distribution Systems by V.Kamaraju, Right Publishers.